

**IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF MASSACHUSETTS**

SINGULAR COMPUTING LLC,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

C.A. No. 1:19-cv-12551-FDS

Hon. F. Dennis Saylor IV

**DEFENDANT GOOGLE LLC'S REPLY IN SUPPORT OF MOTION TO EXCLUDE  
CERTAIN EXPERT TESTIMONY OF SUNIL KHATRI, Ph.D.**

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Singular appears to concede that Dr. Khatri is interpreting the claims in light of the specification, in that it argues in Part III.A.3 of its Opposition that Dr. Khatri was allowed to engage in such an interpretative exercise. But of course, construing the claims is the exclusive province of the Court. In addition to misstating the law on that point, Singular tries to justify Dr. Khatri's improper opinion by claiming that the Court construed a term that it demonstrably did not. Singular's resort to these specious arguments just shows that Dr. Khatri's infringement opinion is irreconcilable with Federal Circuit case law.

Singular also fails to counter the case law rendering Dr. Khatri's opinion on other issues inadmissible. First, Singular grossly mischaracterizes the holding in the Federal Circuit's *Omega Patents* decision, which requires that an expert apportion value only to the patentable improvement when a patent claim covers both conventional elements and patentable improvements. Second, Singular does not even attempt to counter the unambiguous case law that bars a technical expert such as Dr. Khatri from offering an opinion as to economic matters such as commercial success. Third, Singular fails to address—much less distinguish—case law prohibiting an expert from offering an opinion as to intent or state of mind.

**I. NONE OF SINGULAR'S ARGUMENTS JUSTIFY ADMITTING DR. KHATRI'S INFRINGEMENT OPINION; RATHER, SINGULAR'S OPPOSITION CONFIRMS ITS INADMISSIBILITY**

**A. Because Singular effectively concedes that Dr. Khatri applied his own construction of "processing element," Federal Circuit law requires excluding his opinion.**

Dr. Khatri's mapping of the term "processing element" to the accused devices is a critical aspect of his infringement opinion: because these are apparatus claims with structural limitations, it is not enough for Singular to combine operations occurring somewhere on the device to meet the claimed error limitations. Instead, Singular must identify a structure—the "processing element"—that performs a "first operation" meeting the claimed error limitations. *See e.g., Cross*

*Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1312-13 (Fed. Cir. 2005) (confirming that an apparatus claim covers what a device *is* rather than what it *does*).

In defending Dr. Khatri’s opinion, Singular argues two simultaneously inconsistent positions: (i) that Dr. Khatri’s failure to apply the plain and ordinary meaning of “processing element” is okay because the Court construed “processing element,” and (ii) that it was okay for Dr. Khatri to look to the patent specification to interpret the term. The former is demonstrably false and the latter effectively admits that Dr. Khatri engaged in claim construction.

As to the first argument, “processing element” is not found on the list of terms the Court construed and, as the Court noted, came from the agreed portion of the parties’ definitions of “execution unit.” Dkt. No. 354 (“CC Order”) at 16. Although the Court, in addressing the parties’ dispute over what an “execution unit” comprises, did include some discussion of the characteristics of a processing element, it did not *construe—that is, provide a definition of—* “processing element.” Rather, the Court concluded that the claimed “execution unit” is a “processing element comprising an arithmetic circuit paired with a memory circuit.” *Id.* at 30. In so doing, the Court did not offer any observation on the “breadth” of the term processing element, beyond observing—in the context of discussing a treatise that Google cited—that the term “*might be fairly used*” to describe a device that performs “simple functions,” *e.g.*, doing arithmetic without accessing memory. *Id.* at 25 (emphasis added). Nothing in the Court’s analysis suggests that it was adopting an interpretation of “processing element” that would encompass multiple, separate functional blocks across different parts of a chip with a communication bus between them. Yet that is what Dr. Khatri now alleges is a processing element. Indeed, Dr. Khatri’s own opinions provide telling confirmation that the Court did not construe “processing element”: nowhere in its Opposition does Singular cite any place where Dr.

Khatri purports to rely, in his report or deposition, on a Court construction of “processing element,” *see generally* Opp. at 2-6—because Dr. Khatri did not do so.

As to the second argument, Singular tries to defend Dr. Khatri’s opinions by arguing that it is “not at all improper to interpret claim language in light of the specification.” Opp. at 6. Singular’s effort to defend the practice of an expert interpreting the claims in trial testimony is a tacit concession that Dr. Khatri is in fact “interpret[ing] claim language in light of the specification,” which is quintessential claim construction activity. As explained in Google’s Motion, well-established law bars Dr. Khatri from doing so. *See* Mot. at 6-7 (collecting cases). Singular cannot avoid this problem by arguing that Dr. Khatri does not explicitly say that he is construing the claim *in his report*. In fact, that is the problem. His report does not explain whether he’s applying the plain and ordinary meaning of processing element or his own construction of that term. Mot. at 5; Opp. at 5. But when asked at his deposition whether he was applying the plain and ordinary meaning of processing element, Dr. Khatri declined to say he was doing so. Mot. at 4-5 (citing Mot. Ex. 2 (Dkt. No. 481-2) at 171:17-172:1, 172:13-173:4, 174:21-175:3). Instead, Dr. Khatri said that he was interpreting the claim in light of the specification. *Id.* at 5 (citing Mot. Ex. 2 at 183:15-184:2, 185:20-24). As the authorities cited in Google’s Motion confirm, it is not proper for a party or its expert to do so in opinions offered to the jury—only the Court may decide issues of claim construction.<sup>1</sup> Mot. at 4, 6-7.

**B. Singular’s attacks on Dr. Walker’s opinions are irrelevant; in any event, his opinions are within the proper scope of expert testimony.**

Unable to defend Dr. Khatri’s opinions on the merits, Singular pivots to attacking

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<sup>1</sup> For this reason, neither of the two cases that Singular cites in its Opposition, *see* Opp. at 6, are on point, because they address the legal standard to apply at claim construction, not what an expert may testify about at trial. *See Netword, LLC v. Centraal Corp.*, 242 F.3d 1347, 1352 (Fed. Cir. 2001); *Kara Tech. Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1348 (Fed. Cir. 2009).

Google’s non-infringement expert, Dr. Martin Walker. These arguments are spurious and belied by Singular’s failure to file a related motion, even as it was otherwise moving to exclude Dr. Walker’s opinions regarding non-infringing alternatives. *See* Dkt. No. 466 (Singular motion to exclude certain testimony of Dr. Walker and Ms. Laura Stamm regarding reasonable royalty).

Furthermore, the opinions that Dr. Walker has offered are proper and consistent with the permissible scope of expert testimony and the Court’s Claim Construction Order (Dkt. 354, “CC Order”). That is, Dr. Walker is applying the plain and ordinary meaning of “processing element” to formulate his opinion. *See* Mot. Ex. 1 (Rebuttal Expert Report of Martin Walker, Ph.D.) ¶¶ 214-27. This is the proper approach for an expert addressing a term that the Court has not construed, in contrast to Dr. Khatri’s opting to create and apply his own construction. *Apple, Inc. v. Samsung Elecs. Co.*, No. 12-CV-00630-LHK, 2014 WL 660857, at \*3 (N.D. Cal. Feb. 20, 2014) (“At trial, parties may introduce evidence as to the plain and ordinary meaning of terms not construed by the Court to one skilled in the art, *so long as the evidence does not amount to arguing claim construction to the jury.*”) (emphasis added) (internal quotation marks and citations omitted). Moreover, there is nothing improper about Dr. Walker pointing to the specification, in addition to other evidence, as confirmation that his opinion is consistent with the plain and ordinary meaning of processing element. *Id.* at \*4-5 (finding expert’s opinion relying on plain and ordinary meaning permissible where based on expert’s analysis and citation to specification and other evidence).<sup>2</sup> This is fundamentally different from Dr. Khatri’s approach:

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<sup>2</sup> Singular’s attack on the merits of Dr. Walker’s opinion is irrelevant and incorrect. First, Dr. Walker does not limit a processing element to a particular embodiment or to construe the term; rather, he is simply noting that the processing elements described in the Figure 4 embodiment of the specification and [REDACTED] are consistent with his understanding of the term’s plain and ordinary meaning. Mot. Ex. 1 ¶¶ 224-27. Second, as an expert providing an opinion of non-infringement on behalf of an accused infringer, it would be expected that his opinion addresses why the LPHDR execution unit that Dr. Khatri accuses does

he expressly *did not* use the term’s plain and ordinary meaning. Instead, “to understand [the term ‘processing element’] better,” he needed to “look at the patent and any supporting . . . the intrinsic – and the contents of the patent, which would mean the figures and the specification, to inform them further about what processing element would mean.” Mot. Ex. 2 at 183:15-184:2.

**C. Dr. Khatri’s opinions conflict with the Court’s description of a processing element.**

The Court did not construe processing element, as explained in Part.I.A above; however, where the Court did describe a processing element in its Claim Construction Order, Dr. Khatri's opinions are inconsistent with that description. Thus, if Singular were correct and the Court’s Order construed “processing element,” Dr. Khatri’s opinions run counter to that Order.

*First*, the Court describes a processing element as a “tangible object.” CC Order at 24. As set forth in the parties’ briefing on summary judgment of non-infringement, Dr. Khatri’s opinion regarding the “exceeds” limitation conflicts with that conclusion. Because he counts key components of his alleged processing element multiple times, each LPHDR execution unit that he counts for purposes of meeting the exceeds limitation is not a separate tangible object, even though the Court said that the specification requires a processing element—and thus a LPHDR execution unit—to be a tangible object. *See* Dkt. Nos. 461 (Google’s Memo of Law in Support of Summary Judgment of Non-Infringement) & 505 (Singular’s Opposition). When asked at his deposition what would constitute a tangible object, Dr. Khatri consistently refused to give a responsive answer. Declaration of Asim Bhansali in Support of Reply, Ex. 1 (Dep. Tr. of Dr. Sunil Khatri, Vol. I (Mar. 23, 2023)) at 186:23-195:24; 201:15-202:16.

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not satisfy the claim limitations. Singular offers no authority for its supposition that there is something improper about Dr. Walker’s opinions. And, precisely because Dr. Walker is not attempting to construe “processing element,” he does not offer a generalized definition of the term, and instead simply opines as to whether Dr. Khatri’s infringement mapping is consistent with the term’s plain and ordinary meaning.



*Second*, the Court referred to the Figure 4 embodiment in its own description of “processing element,” and—at Singular’s urging—relied in part on that embodiment to limit “execution unit” by requiring it to comprise a “memory circuit.” CC Order at 23-24. While not limiting the claims to the Figure 4 embodiment, the Court did find that the contours of Figure 4 informed its conclusion about what constituted a processing element. But, as explained in Dr. Walker’s report, Dr. Khatri’s mapping of “processing element” is *inconsistent* with Figure 4 of the patent. Mot. Ex. 1 ¶¶ 224-27.<sup>3</sup>

## II. SINGULAR MISSTATES THE LAW AND RECORD IN A FUTILE ATTEMPT TO SALVAGE DR. KHATRI’S IMPROPER APPORTIONMENT OPINION.

Dr. Khatri’s apportionment analysis fails in two separate, independent ways. First, as to claimed features, he improperly fails to apportion between patentable improvements, for which Singular can claim value, and conventional features, for which it cannot. Singular’s argument fails to distinguish the Federal Circuit decision in *Omega Patents, LLC v. CalAmp Corp.*, 13 F.4th 1361 (Fed. Cir. 2021). Second, while Singular admits Dr. Khatri was required to apportion between claimed and unclaimed features, Dr. Khatri also did this improperly, because he apportioned at the system level rather than the chip level. Such an analysis required Dr. Khatri to *start* his apportionment at the chip, not to start at the system level and then “normalize” back to the chip level as Singular admits Dr. Khatri did. *See Microchip Tech. Inc. v. Aptiv Servs. US LLC*, No. 1:17-cv-01194-JDW, 2020 WL 5203600, at \*5-6 (D. Del. Sept. 1, 2020).

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<sup>3</sup> Singular has not to date offered any rebuttal to Dr. Walker’s opinion, and at his deposition Dr. Khatri was not prepared to respond to Dr. Walker’s opinion, because Singular apparently had not provided him with Dr. Walker’s report, even though Dr. Walker’s report was served three weeks prior to Dr. Khatri’s deposition.

**A. Federal Circuit precedent bars Singular from apportioning value to conventional features even if they are covered by elements of the asserted claims.**

Singular’s attempt to distinguish the on-point Federal Circuit precedent in *Omega Patents* relies on a distinction without a difference: apportioning to exclude “unpatented features of the accused product”—as Singular admits the law requires—versus apportioning to exclude “unpatentable features of the claimed invention”—which Singular says is not required. Opp. at 8-9. This distinction is logically meaningless because, if a feature is present in a claim but is not itself patentable, then that same feature, if present in the accused product, would also be unpatented. So, to apportion value to just the *patented* features of the accused product, Dr. Khatri had to limit his apportionment to the *patentable* features in the claims, rather than apportioning value to every element, including those that the PTAB found unpatentable and conventional.

This irrefutable logic is exactly what the Federal Circuit applied in the *Omega Patents* case. There, the Federal Circuit rejected the patentee’s attempt to justify its expert’s failure to apportion value to the patentable improvement by arguing that the accused product had no parts outside what was included in the asserted claim. As the Federal Circuit explained: “We therefore reject Omega’s contention that it was not required to show apportionment simply because the jury heard testimony that the [accused] LMUs [Location Management Units] have no component parts outside what is claimed in the ’278 patent.” *Omega Patents*, 13 F.4th at 1377. Thus, because the asserted claims and the accused LMUs included “conventional components,” the Federal Circuit ordered a new trial on damages, holding that the patentee “failed to show the incremental value that its *patented improvement* added to the LMU product *as apportioned from the value of any conventional features*.” *Id.* at 1377-78 (emphasis added). Notably, *Omega Patents* did not announce a new rule regarding apportionment; instead, it just applied existing Federal Circuit precedent. *Id.* (citing *Exmark Mfg. Co. v. Briggs & Stratton Power Prods. Grp.*,

*LLC*, 879 F.3d 1332, 1348 (Fed. Cir. 2018)). In *Exmark*, the patent owner was not entitled to the value associated with the conventional components of a lawn mower, it was only entitled to the value of the patented improvement, *i.e.*, an improved flow control baffle. 879 F.3d at 1348.

The same reasoning applies here. Singular does not even contend in its Opposition that Dr. Khatri apportioned value only to the patented improvement in the asserted claims, *i.e.*, the feature(s) claimed in the “exceeds” limitation. Rather, Dr. Khatri apportioned value based on use in the accused TPU v2 and TPU v3 products of an accused LPHDR execution unit. Mot. at 9, 12. But an LPHDR execution unit standing alone was found in the IPR proceeding to be obvious. *Id.* Thus, Singular is not entitled to the value of an LPHDR execution unit alone, the low-precision high-dynamic range operations such EUs can perform, or even the use of multiple such EUs; it is only entitled to the value (if any) associated with the ability to use 100 more of such execution units than 32-bit FP multipliers. Accordingly, because Dr. Khatri did not perform that apportionment of the patentable improvement from conventional features, his analysis is inadmissible “as a matter of law.” *Omega Patents*, 13 F.4th at 1377.<sup>4</sup>

Finally, Singular’s attempt to salvage Dr. Khatri’s opinion by pointing out that the accused TPUs contain many accused LPHDR execution units fails as well. First, this argument mischaracterizes the patented improvement that survived the IPR. The “exceeds” limitation does not require simply having at least 100 LPHDR execution units; it requires having at least 100 more LPHDR execution units than units adapted to perform at least the operation of

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<sup>4</sup> Applying Singular’s own analogy, a claim on concrete could specifically recite it as a mixture comprising water, gravel, and cement. Concrete is like the “exceeds” element, *i.e.*, it has not been found unpatentable, and cement is like the LPHDR execution unit, *i.e.*, it has been found conventional and not a patentable improvement. Dr. Khatri was free to apportion the value of concrete—the “exceeds” element—to Singular; the problem is that Dr. Khatri is improperly apportioning to Singular all the value attributable to cement—the LPHDR execution unit—even though it is indisputably conventional.

multiplication on floating point numbers that are at least 32 bits wide. Thus, even if Dr. Khatri had isolated the value of having many LPHDR execution units as opposed to just one—which he has not—that would still fail to apportion value to the patented improvement; that value is limited to what is attributable to having at least 100 more LPHDR execution units than 32-bit units and must apportion out the value of any conventional components, including the LPHDR execution unit itself. Moreover, Singular’s argument conflates infringement with apportionment of value to the patentable improvement: opining that the accused TPU v2 and TPU v3 satisfy the “exceeds” limitation, which is necessary for infringement, does not excuse Dr. Khatri from apportioning the value of that feature, which is the only patentable improvement, as distinct from other features, which are conventional.

**B. Dr. Khatri’s report and testimony belie Singular’s argument that he applied a chip-level comparison to GPUs; this is an independent reason to exclude his opinion.**

Even if Dr. Khatri’s methodology of comparing TPUs to GPUs without first apportioning to patentable improvements were otherwise proper—and it is not as explained in Part.II.A above—his methodology would still be improper for failing to do a chip-level comparison. Singular agrees that apportionment principles require, at a minimum, that Dr. Khatri’s comparison to GPUs be performed at a chip level rather than a system level. *See* Opp. at 11, Part II.B.3 (not disputing that Dr. Khatri was required to do a chip-level comparison); *see also* Mot. at 13-15 (chip-level comparison required) (citing *Microchip Tech.*, 2020 WL 5203600, at \*5-6). Singular tacitly admits that Dr. Khatri performed a system- rather than chip-level analysis: it states that the data Dr. Khatri used “while generated using TPU/GPU *systems*, are *normalized* to allow comparisons between the TPU/GPU chips themselves.” Opp. at 11 (emphasis added).

Thus, Singular’s only argument for salvaging Dr. Khatri’s admitted system-level comparison is that results have been “normalized” to allow a chip-level comparison. This

argument fails for several reasons. First, Singular’s theory is the exception that swallows the rule: if normalization, *i.e.*, adjustment, of a system analysis back to the component level were sufficient to meet the Federal Circuit’s apportionment requirements, then every apportionment analysis could begin at the system level, even though the patented feature covers only a component of the system. But this kind of top-down analysis that starts at the system level is exactly what the Federal Circuit’s standard precludes, because starting at the system level creates an undue risk that the apportionment process will not adequately apportion out the value of unpatented features. *See Microchip Tech.*, 2020 WL 5203600, at \*5-6 (applying the Federal Circuit’s apportionment standard and noting that “[n]arrowing the focus to the smallest patent-practicing unit mitigates” the risk “of awarding damages for non-patented features”). The fact that Dr. Khatri purports to normalize his system-level analysis to the chip level is insufficient under the Federal Circuit’s test. *See id.* (excluding damages expert’s reasonable royalty analysis because the “patented invention” extended only to the chip—*i.e.*, “the smallest patent-practicing unit”—but the expert focused on the value of the device containing that chip).

Furthermore, Dr. Khatri’s resort to a system-level approach in this case is particularly egregious because he affirmatively ignored chip-level data and data from smaller-scale systems in order to latch onto larger-scale system level data that incorporated more unpatented features than chips and smaller-scale systems. For example, the chart (extracted from a Google document) that Dr. Khatri includes in paragraph 273 of his report reflects a direct chip-level comparison [REDACTED], yet Dr. Khatri does not rely on this comparison in his report. *See* Mot. Ex. 3 (Expert Report of Sunil P. Khatri PhD) ¶¶ 273-277.<sup>5</sup> Instead, Dr. Khatri relies on a system-level comparison. Even there,

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<sup>5</sup> As cited in Google’s Memorandum ISO Motion to Exclude as to Singular Damages Expert

Dr. Khatri makes a comparison to a [REDACTED] system analysis rather than a much smaller [REDACTED] analysis, even though the document to which he cites contained both, *id.* at 53. The latter would use fewer unpatented features than the former, because at least some of the unpatented features increase with the number of chips.<sup>6</sup> Furthermore, the existence of a chip-level comparison undercuts Singular’s entire rationale for justifying a system-level comparison. Singular claims that it had to do a system level comparison “[b]ecause computer chips cannot operate outside a computer” and thus it was necessary to do comparisons with “working computer systems.” Opp. at 11. But it fails to explain why Dr. Khatri failed to use the existing chip-level comparison that was available to him. *See GPNE Corp. v. Apple, Inc.*, No. 12-CV-02885-LHK, 2014 WL 1494247, at \*12-\*13 (N.D. Cal. April 16, 2014) (for claims drafted to cover a “device,” SSPU test requires focusing on components actually embodying the invention).

In sum, Singular concedes that Dr. Khatri had to perform a chip-level analysis, and it fails to justify his using system level analyses as the starting point rather than chip-level analyses.<sup>7</sup>

### **III. SINGULAR DOES NOT COUNTER DR. KHATRI’S LACK OF EXPERTISE ON COMMERCIAL SUCCESS OR HIS FAILURE TO IDENTIFY A NEXUS TO THE PATENTABLE INVENTION.**

Singular does not even address—much less distinguish—the authority Google cites showing that courts routinely exclude testimony from technical experts opining on non-technical

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Philip Green (Dkt. 477), there are also other documents in the record providing chip-level comparison, which further undercut Singular’s rationale for needing to do a system-level comparison. *See, e.g.*, Dkt. 478-7, at 260 & 478-8, at 449.

<sup>6</sup> As just one example, it is undisputed that the [REDACTED] are unpatented features included in systems but not in chips. *See* Mot. Ex. 3 ¶¶ 298-99. Thus, starting an apportionment analysis with a system would require backing out the value attributable to these features, whereas starting at the chip level would not. And, a larger system would use more of these features than a smaller system.

<sup>7</sup> Singular’s suggestion that Dr. Khatri did receive legal instructions regarding the standard for apportionment (*see* Opp. at 10), fails in light of his unequivocal deposition testimony to the contrary. *See* Mot. at 9. But regardless of what legal instructions Dr. Khatri did or did not receive, his analysis is flawed for the reasons explained in Parts II.A and II.B herein.

aspects of commercial success. *Compare* Mot. at 16-17 (collecting cases) *with* Opp. at 11-12. Singular offers only the *ipse dixit* that “one does not have to be an economist to understand” that the accused TPUs are a commercial success. *See* Opp. at 12. That statement is irrelevant to Dr. Khatri: he will *testify as an expert*, and so any testimony he offers must be tethered to his expertise. Because his expertise is *technical*, he is not qualified to opine on commercial success. *See Wasica Fin. GmbH v. Schrader Int’l, Inc.*, 432 F. Supp. 3d 448, 460 (D. Del. 2020) (precluding technical expert from testifying on commercial success due to lack of qualifications).

Further, Dr. Khatri’s commercial success testimony is inadmissible for the separate reason that his opinion regarding the “nexus” between “the commercial success and the patented invention” is flawed, because Dr. Khatri expressly relies on an impermissibly broad view of the “*patented invention*,” as discussed *supra* Part.II.B.2. Dr. Khatri’s opinions assume an inventive scope that includes an element that the PTAB found (and Singular no longer disputes is) unpatentable and conventional—LPHDR execution units.

#### **IV. DR. KHATRI IS NOT PERMITTED TO TESTIFY TO GOOGLE’S STATE OF MIND EVEN IF HE IS QUOTING DOCUMENTS.**

Singular cites no authority for its position that Dr. Khatri may opine as to Google’s state of mind; there is none. Courts have consistently held: an expert *cannot* opine as to intent or state of mind. *See* Mot. at 18 (collecting cases). That authority specifically applies to documentary evidence. Thus, Singular cannot get around it by having Dr. Khatri offer his opinions regarding state of mind through documentary evidence. *See* Mot. at 19 (collecting cases).

#### **V. CONCLUSION**

For all the foregoing reasons, as well as the reasons stated in Google’s Motion, Dr. Khatri’s opinions should be excluded as set forth in the Motion.

Respectfully submitted,

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**CERTIFICATE OF SERVICE**

I certify that this document is being filed through the Court's electronic filing system, which serves counsel for other parties who are registered participants as identified on the Notice of Electronic Filing (NEF). Any counsel for other parties who are not registered participants are being served by first class mail on the date of electronic filing.

/s/ Nathan R. Speed

Nathan R. Speed